ANIMAL FEED SUPPLEMENT FOR THE NUTRITIONAL ENRICHMENT OF ANIMAL PRODUCE

BACKGROUND

The present invention relates to nutritional enrichment of foodstuffs such as, but not limited to pork, beef, poultry and the like and more particularly relates to the use of a selection of feed supplements formulated for feeding to animals at predetermined stages of growth and which include increased levels of omega 3 long chain fatty acids. The invention further provides feed formulae for animals at various stages of development and which result in produce having an increased human nutritional quality due to an increased level of long chain omega 3 fatty acids but without taint of the food product. Whilst the supplement and formulae of the present invention are suitable as feed for producing high nutritional quality beef and poultry (in the latter case influencing the nutritional value of poultry meat and eggs) the invention will mainly be described with reference to its application in pig feeding.

PRIOR ART

It is long established that there is a direct relationship between animal feed and the quality of food produce from a particular animal. An example of this relationship is evident where fish meal is used in pig feeding with the constituent ingredient levels of fish meal impacting on the nutritional quality of the food.

The food industry, in recognition of the desirability of lowering of saturated fats in the human diet has paid particular attention to improvement of the nutritional quality of foodstuffs and this begins with the animal feed blends. For instance, in the last ten years the average fat content of pork has been reduced by more than 50% in direct response to consumer demand for low fat diets in view of the links between high cholesterol, heart disease and a high fat diet. Animal products including pork also contain polyunsaturated fatty acids (PUFA). Pork and animal product

producers have in recognition of the high nutritional benefits of long chain omega 3 PUFA and the consequent high consumer demand for foods with high yields of these nutrients have paid particular attention to the sources of these fatty acids and more particularly to ways of fortifying foods with long chain omega 3 PUFA.

Omega 3 polyunsaturated fatty acids, like vitamins, are essential to good health but as the body cannot itself manufacture these essential acids and vitamins it must rely on food sources for the requisite supply of these necessities. Foods rich in long chain omega 3 fatty acids are generally not a regular part of the diet so most people are denied the full potential benefits of the presence of these in the diet.

Polyunsaturated fats are divided into the omega 3 and omega 6 fatty acids both of which the body needs. The effects of long chain omega 3 fatty acids on the body are significant as they are incorporated into every cell, tissue and organ including the heart and lungs, blood vessels, brain and joints.

There are a variety of food sources of long chain omega 3 fatty acids for example, Alpha - linolenic acid (ALA) occurrs in oils such as canola, linseed (flaxseed), walnut and soybean as well as in green vegetables. Eicosapentaenoic acid (EPA) can be found in cod liver oil, fish oils fish and other seafoods and even in beef. Docosahexaenoic acid (DHA) is found in tuna oil, other fish oils and in breast milk.

While omega 6 fatty acids are also beneficial and necessary for a good diet, the ratio of omega 6 fatty acids to omega 3 should be less than 5:1 and preferably 1:1. An excess of omega 6 acids can negate the effect of the long chain omega 3 fatty acids. Long chain Omega 3 fatty acids (EPA and DHA) are derived from fish and are more potent than the short chain omega 3

derived from plants (ALA) as they are taken up directly by the cells. The evidence for the health benefits of DHA and EPA in the diet is nowhere better demonstrated than in Japanese fisherman and Eskimos who both have diets high in fish and a low incidence of heart disease. Omega 3 fatty acids also play a role in slowing the build up of fats on the walls of blood vessels, reducing blood clotting, reducing blood pressure and decreasing arythmia. There is also evidence that omega 3 fatty acids can reduce risk of cancer and depression and can strengthen the immune system.

The problem for the food industry has been to determine the most effective means of introducing long chain omega 3 fatty acids into the diet without compromising the physical, textural and sensory quality of the food vehicle. Egg producers introduced long chain omega 3 fatty acids into eggs by feeding hens foods such as fish meal which are high in these acids only to discover that the eggs tasted like fish leading to a reduction in consumption of such fat modified eggs. The hens were then fed a unique vegetarian diet of natural foods that are rich in long chain omega 3 fatty acids but there are significant restrictions on how much fatty acid can be introduced due to the problem of sensory taint. This is also the experience in the pork industry where fish meal has been fed to pigs to increase the level of long chain omega 3 fatty acids in consumers of pork, but the meat has also suffered from fishy taint which significantly reduces the level of omega three fatty acids which can be introduced.

According to conventional wisdom, high intakes by pigs of fishmeal as a source of long chain omega 3 PUFA above relatively low levels of 2 - 5% of the food vehicle results in pork taint manifested by decrease in oleic acid content, increase in iodine value (hence oxidizability), as well as softening of the carcass fat. Thus there has traditionally in use of PUFA been a necessary

compromise between achieving an optimum nutritional value associated with use of PUFA's while guarding against taint from excessive use.

This has kept the use of PUFA's in pig feed to low levels primarily due to the undesirability of taint. The problems of taint and the desirability of increasing the PUFA content in the human diet has been recognised in the industry literature; [see for instance the article entitled " Omega 3 Enriched Pork" by Peter R.C. Howe - Department of Biomedical Science, University of Wollongong, NSW, Australia]. For an enriched omega 3 product to be regarded as a useful dietary source it should be able to increase the level of omega 3 fatty acids present in the circulation when consumed in reasonable quantities. Although increases have been reported for comsumption of omega 3 eggs there has been no similar demonstration of potential benefit to humans with other alternative dietary sources of marine omega 3 fatty acids apart from refined fish oil supplements.

In recognition of the benefits of long chain omega 3 PUFA, the food industry turned its attention to identifying an economic and plentiful source of these acids. Fish oil was considered an obvious source of these fatty acids and experimentation was conducted to determine the levels which could be used in pork recognising that levels above a desirable maximum, could result in taint of the pork.

An industry objective has therefore been to determine the extent of omega 3 PUFA enrichment of animal produce that could be achieved using fish meal without the problems of taint.

Experimentation found that only very low percentages 0.8 - 1.4% of fish oil could be used in the diet and it was found preferable that the use should be terminated or reduced to the lowest levels before slaughter. The experiments demonstrated that increasing fish oil intake increased the

percentage of long chain omega 3 PUFA and therefore the nutritional qualities of the produce. It was also found that where diets contained 3% fish oil up to slaughter, the organoleptic quality of the pork was affected. The industry then turned its attention to the use of fish meal as a source of long chain omega 3 PUFA for the enrichment of pork but taint of the physical and sensory qualities of the pork remained a problem. The industry currently recommends that the fish meal content of pig rations not exceed 5% of the total diet and only where the fish meal is withdrawn 5 - 7 weeks before slaughter. Where the pigs are fed fish meal up to slaughter it is recommended that the level of fish meal in the diet not exceed 3%. The conventional source of fish meal is pelagic fish, which when rendered into meal, normally has an oil content of 6%- 9%.

The applicant has for some time (in order to meet the challenge of elimination of taint) been involved in experimentation to determine fish meal formulae for feeding to animals [depending upon the stage of development of the animal to which the food blend is fed] to optimise the retention of omega 3 long chain PUFA but without taint caused by the fish meal through off flavours and rancidity of the produce.

Although experts in the field have postulated as to possible ways to increase the use of fish meal without taint of the produce, no one to date has succeded in increasing the fishmeal level above 3 %-5% of the total diet without risk of taint of the produce. Some in the food industry advise against feeding fish meal at any time during the 14 day period before slaughter to eliminate the possibility of taint.

The August 1998 issue of the organ of the Fishmeal Information Network commissioned an independant study by a pig nutritionist to review the available data on use of fish meal in feeding pigs. The study found that fish meal, provided that it does not exceed 10% oil content, can be fed at up to 7.5% of the diet without presenting any problems of taint in the end product. The

findings do however recognise that for 100% security against taint, percentage levels of fish meal in the diet should be set below 7%. Thus it is generally recognised in the industry that it is undesirable to increase the percentage of fishmeal beyond 3% - 5% percent to be sure of elimination of taint.

INVENTION

The present invention seeks to ameliorate or eliminate the aforesaid problems of the prior art relating to taint in produce by providing feed formulae which optimise the level of use of fishmeal in the diet of an animal, above percentages previously achieved and without the problem of taint through off flavours and rancidity. According to one embodiment of the invention, fish meal from cannery scrap of oily fish is used which produce a meal with 11%- 13% oil containing approximately one third of omega 3 fatty acids.

In its broadest form the present invention comprises: an animal feed supplement utilising fish meal as a source of omega 3 long chain fatty acids for inclusion in the diet of said animal; wherein, the fatty acids are increased to a level which maximises the nutritional value of the produce from said animal due to increased level of long chain omega 3 fatty acids but without taint of said produce.

In another form the present invention comprises: a fishmeal food supplement for feeding to animals wherein the content of omega 3 long chain fatty acids in animal produce such as pork, eggs poultry meat, beef and farmed fish is maximised to a level which is nutritionally optimal but without taint of the produce; wherein the percentage of fishmeal food supplement is greater than 5% of the total dietry dietary intake of the animal.

The percentage of supplement in the total diet of the animal is greater than 5% and preferably 15% to produce the long chain fatty acids Decosahexaenoic Acid (DHA), Docosapentaenoic

acid (DPA) and Eicosapentaenoic acid (EPA).

In another broad form the present invention comprises food supplement for feeding to animals in which the level of long chain omega 3 is increased to increase the nutritional quality of the animal produceand without taint of the produce; wherein the supplement includes a blend of fish meal, an oil based premix, a drymix premix and water based green tea extract.

Preferably, the supplement constituents are blended according to the following proportions;

	kg	%
Fish Meal	983.00	98.300
Oil based premix	10.00	1.000
Dry mix Premix	5.00	0.500
water based green tea	2.00	0.200
	1000.00	100.000

Preferably the oil based premix of the supplement comprises a blend of the following ingredients;

Ethoxyquin vitamin grade	Crude palm oil
Aniseed China Star	Rosemary oil
Thyme white oil	Peppermint oil
Benzoic Acid	Phosphoric Acid 81%
Crude Canola oil Carrier.	

According to one embodiment, the constituents of the oil based premix per tonne of a food base are blended in the following proportions

	kg	%
Ethoxyquin vitamin grade	0.400	4.00
Crude palm oil	1.500	15.00
Aniseed China Star	0.067	0.67
Rosemary oil	0.100	1.00
Thyme white oil	0.100	1.00
Peppermint oil	0.150	1.50
Benzoic Acid	0.005	0.05
Phosphoric Acid 81%	0.250	2.50
Crude Canola oil Carrier.	7.428	74.28
	10.000	100.00

Preferably, the dry mix premix comprises a blend of the following ingredients;

Vitamin E 50	Vitamin C
Citric Acid	Propyl Gallate
Calcium Propionate	Wheat Meal Carrier

Preferably, the dry mix premix comprises the following proportion of constituents;

	kg	%
Vitamin E 50	0.800	16.00
Vitamin C	0.500	10.00
Citric Acid	0.500	10.00
Propyl Gallate	0.100	2.00
Calcium Propionate	0.500	10.00
Wheat Meal Carrier	2.600	52.00
	5.000	100.00

According to a preferred embodiment, the Vitamin C and Citric Acid are scavenger antioxidants.

In another broad form the present invention comprises a food supplement for feeding to animals to maximise the level of long chain omega 3 fatty acids in the animal produce and without taint of the produce; wherein the supplement comprises a blend of fish meal, an oil based premix and a drymix premix blended in the following proportions:

	kg	%
Fish Meal	985.00	98.500
Oil based premix	10.00	1.000
Dry mix Premix	5.00	0.500
	1000.00	100.000

In another form the present invention comprises a food supplement for feeding to animals to maximise the level of long chain omega 3 fatty acids in the animal produce and without taint of the produce; wherein the supplement comprises tuna meal, an oil based premix, a dry mix premix, water based green tea extract wherein the supplement includes the following constituents;

Fish Meal
Crude palm oil
Rosemary oil
Peppermint oil
Phosphoric Acid 81%
Vitamin E 50
Citric Acid
Calcium Propionate
Ethoxyquin vitamin grade
Aniseed China Star
Thyme white oil
Benzoic Acid
Crude Canola oil Carrier.
Vitamin C
Propyl Gallate
Wheat Meal Carrier

In another broad form the present invention comprises a food supplement for feeding to animals to maximise the level of omega 3 fatty acids in the animal produce and without taint of the produce; wherein the supplement comprises fish meal, an oil based premix, a dry mix premix and water based green tea wherein the fish meal, dry mix premix and oil based premix collectively include the following constituents;

Tuna Meal
Crude palm oil
Thyme white oil
Benzoic Acid
Crude Canola oil Carrier.
Vitamin C
Propyl Gallate
Ethoxyquin vitamin grade
Rosemary oil
Peppermint oil
Phosphoric Acid 81%
Vitamin E 50
Citric Acid

In another broad form the present invention comprises a food supplement for feeding to animals to maximise the level of omega 3 fatty acids in the animal produce and without taint of the produce; wherein the supplement comprises fish meal, an oil based premix, and a water based green tea extract and a drymix premix including the following relative proportions of constituents;

	%
Tuna Meal (containing 11% - 13% oil)	98.500
Ethoxyquin vitamin grade	0.040
Crude palm oil	0.150
Rosemary oil	0.010
Thyme white oil	0.010
Peppermint oil	0.015
Benzoic Acid	0.001
Phosphoric Acid 81%	0.025

Crude Canola oil Carrier.	0.743
Vitamin E 50	0.080
Vitamin C	0.050
Citric Acid	0.050
Propyl Gallate	0.010

According to a preferred embodiment, the supplement further comprises the following consituent percentage proportions;

	%
Vanillic Crystals	0.013
Aniseed China Star	0.007
Calcium Propionate	0.050
Wheat Meal	0.260

In another form the present invention comprises a food supplement for feeding to animals to maximise the level of long chain omega 3 fatty acids in the animal produce and without taint of the produce; wherein the supplement comprises fish meal, an oil based premix, a drymix premix, and water based green tea extract blended in the following proportions per tonne of food base:

	kg	%
Tuna Meal	985.000	98.500
Ethoxyquin vitamin grade	0.400	0.040
Crude palm oil	1.500	0.150
Aniseed China Star	0.067	0.007
Rosemary oil	0.100	0.010
Thyme white oil	0.100	0.010
Peppermint oil	0.150	0.015
Benzoic Acid	0.005	0.001
Phosphoric Acid 81%	0.250	0.025
Crude Canola oil Carrier.	7.428	0.743
Vitamin E 50	0.800	0.080
Vitamin C	0.500	0.050
Citric Acid	0.500	0.050
Propyl Gallate	0.100	0.010
Calcium Propionate	0.500	0.050
Wheat Meal Carrier	2.600	0.260
	1000.000	100.000

The fish meal may be selected from Tuna, Mackerall, Sardine, Pilchard or Anchovies but it will be appreciated that marine fish oil may be derived from other species.

According to the method aspect of the present invention there is provided a method of feeding animals using a fish meal based food supplement with 11% - 13% fish oil wherein the supplement comprises at least 5% - 20% of the animals' total diet wherein the method comprises the following steps:

a) selecting constituents for a supplement including fish meal, an oil based premix, a dry mix premix and a water based green tea extract

b) preparing the dry mix and the oil based premix;

c) blending the constituents in predetermined proportions of the supplement;

d) selecting additives for the supplement appropriate to the stage of development of the animal and blending the additives with the fish meal, oil based premix, dry mix premix and water based green tea extract;

e) feeding an animal with the supplement blended according to the stage of development of the animals selected for feeding so that the food produce from said animals has an optimum level of long chain omega three fatty acids yet is free from taint and wherein the supplement may comprise between 5% - 20% of the total diet of the animal.

According to another form of the method aspect of the present invention there is provided a method of feeding animals using a fish meal based supplement at a level within the range of 10% - 20% of the animal's total diet, wherein the supplement comprises the following active ingredients

Tuna Meal
Ethoxyquin vitamin grade
Crude palm oil
Rosemary oil

Thyme white oil
Peppermint oil
Benzoic Acid
Phosphoric Acid 81%
Crude Canola oil Carrier.
Vitamin E 50
Vitamin C
Citric Acid
Propyl Gallate

wherein the method comprises the following steps:

a) selecting constituents for a supplement including fish meal, an oil based premix, a dry mix premix and a water based green tea extract

b) preparing the dry mix and the oil based premix;

c) blending the constituents in predetermined proportions of the supplement;

d) selecting additives for the supplement appropriate to the stage of development of the animal and blending the additives with the fish meal, oil based premix, dry mix premix and water based green tea extract

e) feeding an animal with the supplement blended according to the stage of development of the animals selected for feeding so that the food produce from said animals has an optimum level of long chain omega three fatty acids yet is free from taint and wherein the supplement comprises between 5% - 20% of the total diet of the animal.

According to a preferred embodiment the method comprises the further step prior to or after blending of the dry mix and fish meal of :

a) preparing the ingredients of said oil emulsion according to the following mixing sequence;

Crude Canola Oil
Crude Palm Oil
Phosphoric Acid 81%
Benzoic Acid

Ethoxyquin Vitamin Grade
Aniseed China Star
Rosemary Oil
Thyme White Oil
Peppermint Oil

b) high speed mixing of said ingredients to create a homogeneous stable emulsion.

According to the preferred embodiment, the method includes the following step prior to steps a) and b) last mentioned above of preparing the ingredients according to the following steps:

i) heating to above 50 degrees C to liquify the Crude palm oil;

ii) heating to above 22 degrees C to liquify the Aniseed china star

iii) heating to above 20 degrees C to liquify the Crude Canola Oil.

According to a preferred embodiment the method comprises the further step prior to or after blending of the oil emulsion and fish meal of preparing the dry mix by combining the following ingredient sequence:

Wheat Meal	Vitamin E - 50
Vitamin C	Citric Acid
Propyl Gallate	Calcium Propionate
Green Tea Powder	Vanillic Crystals

According to one embodiment of the method aspect , the Oil Emulsion may be applied by fine spray to the Fish(Tuna) meal; the Aqueous Extraction to be applied by fine spray to the Tuna meal; the dry mix to be added to the Tuna meal followed by mixing the whole to produce a homogeneous blend. Nutritional Premixes supplying the Vitamin, Mineral requirements of particular species and stage of life cycle/development may be included in the supplement to satisfy the nutritional completeness of the appropriate supplement

According to the invention, the feed supplement provides a supply of long chain fatty acids

such as DHA, DPA and EPA in contrast to the short chain fatty acids which are obtained from certain vegetable sources.The long chain omega 3 fatty acids will be absorbed directly into the animal body in their existing biological form exerting beneficial physiological change and direct deposition in the blood stream, body cells and fat depots unlike the Short Chain Fatty Acids which require conversion by the animal to long chain fatty acids which is inefficient and poor yielding.

DETAILED DESCRIPTION

The present invention will now be described according to preferred but non limiting embodiments and with reference to various examples wherein;

Figure 1 shows a schematic layout of a typical process for the preparation of a feed supplement according to one embodiment of the invention.

Annexure 1 shows a variety of supplement formulae according to various embodiments of the invention and adapted for feeding at various stages of development of an animal.

The supplement blends according to the examples to be described provide a consistent high source of omega 3 long chain fatty acids, especially DHA in animal diets to thereby increase the intake of omega 3 long chain fatty acids in the human diet. The supplement blends have been found to eliminate taint of the resultant produce and to enhance the flavour of the produce. Conventional wisdom prior to the the invention required the implementation of at least a 14 day fishmeal exclusion prior to slaughter to avoid fish taint. This 14 day exclusion period presents practical difficulties on farms where the producer is forced by farm circumstances to operate with a single stage finishing diet. In some cases it could lead to the withdrawal of fishmeal in the diet at a much earlier stage with possible adverse implications for livestock health. There is concern

that the 14 day exclusion could be increased for many weeks and posssibly up to 12 weeks. Experts currently believe that when feeding fishmeal up to 5% of the dietary intake of the animal there is a comfortable safety margin for eliminating off flavours in the animal produce, provided that as an added safeguard fishmeal is excluded from the diet two months before slaughter.

The present invention challenges convention wisdom and overcomes the problems of prior art fishmeal feed formulae by providing a range of fishmeal feed supplements which may be significantly above the currently recognised upper percentage limits for elimination of taint but which do not result in taint of the produce.

Taint in foodstuffs is normally determined by a Sensory Panel of experts who are trained in determining whether a particular foodstuff has certain taste characteristics. Thus one expert may have a proven sensitivity to sweetness, in cheese and another in meats. Other experts can determine whether animal produce is tainted with a fishy taste after feeding with fish meal.

Trials were conducted to determine whether animal produce from animals fed with the feed supplements and associated formulae according to the present invention were tainted. Although prior to the invention, experts believed that fishmeal supplements greater than 5% of the total diet of the animal would lead to fishy taint, the Sensory Panel evaluating the Supplements and formulae according to the invention (marketed under the trade mark name Porcomega) fed to pigs found that supplements greater than 5% of the total diet of the animal did not result in taint of the produce.

Tests on the effects on animal produce of fish meal supplements according to the invention and greater than 5% of the total diet of the animal were carried out in the Commonwealth Scientific and Industrial Research Organisation Department of Human Food Nutrition in Adelaide, Australia. The panel found that the produce tested did not suffer from fishy taint.

Preferably, the percentage range of fishmeal with fish oil content between 11- 13 % in the diet of an animal in which omega 3 fatty acid enrichment is required is 5%- 20%. Due to the blends of the supplements used, the fishmeal may be fed up to slaughter in these percentages.

Figure 1 shows a schematic layout of a typical process for the preparation of feed supplements according to the method aspect of the present invention.

According to the method aspect of the invention, quality control is most important for conformity of the finished supplement and its raw materials. As a matter of routine practice, the constituent ingredients should be checked for physical conformity and condition. Preferably, chemical analyses are carried out and with checks for any infestations from insects etc. The ingredients must be free from rancid, musty, stale or any other objectionable odours. Therefore, thorough physical examination is important.

Prior to the start of each production run and after any extended downtime, the process line is evaluated to verify that the line is in satisfactory condition and that all controls are calibrated and functioning. This is described as calibration step 1.02.

Step 1.1 involves the preparation of the dry mix wherein bulk ingredients 1.11 are selected according to the particular formula, followed by calibration step 1.12 involving weighing out bulk ingredients. The ingredients are then transferred for mixing. Step 1.3 is preparation of the oil based premix. Preparation of the oil based premix involves the following steps. The raw materials are selected and weighed 1.31 according to the selected formula. These materials are mixed 1.32 by stirring with preweighed preheated 70 degrees C oil carrier in a steam jacketed mixing vessel. The mix is then held for quality control step 1.33 followed by calibration step 1.35 wherein the mix is metered into the dry mixer according to formula.

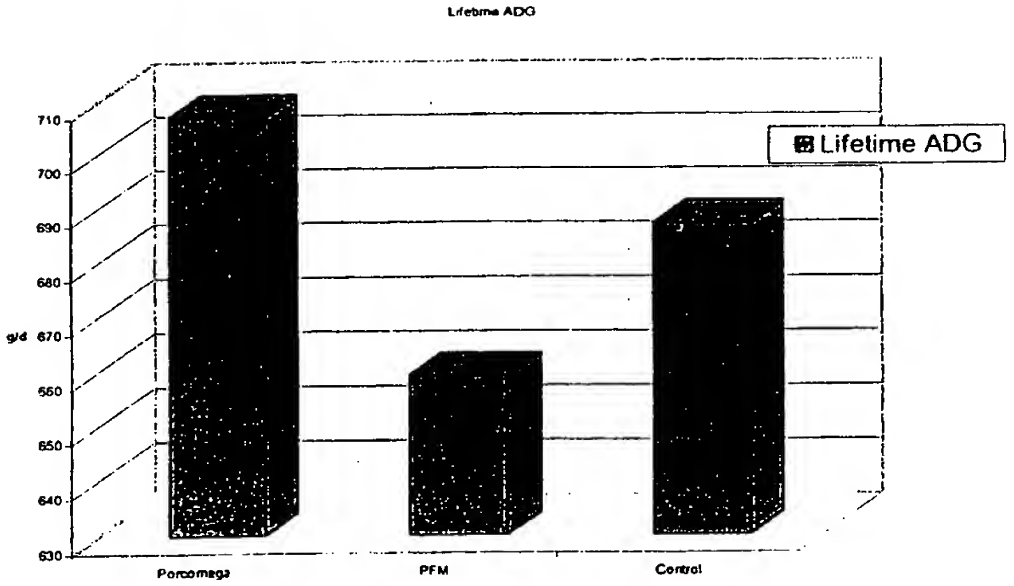
Step 1.4 is the preparation of the Dry Mix Premix. Step 1.41 is the selection and weighing of the

ingredients according to formula. In step 1.42 the ingredients are mixed together followed by quality control step 1.43 and calibration step 1.44 wherein the mix is metered into the bulk dry mixer according to formula. The next phase step 1.5 involves the following procedure. Step 1.51 is the selection and weighing of ingredients according to formula. In step 1.51 ingredients are added to preweighed water heated to 100 degrees C in the steam jacketed reaction vessel followed by mixing step 1.53. In step 1.54 a preweighed Green Tea ingredient retained in a cloth bag is infused into the mix. In step 1.55 the green tea is extracted for 30 minutes and the spent Green Tea is discarded. Step 1.56 involves metered mixing according to formula into the bulk dry mixer. According to steps 1.15 to 1.19 the mixture is mixed for 10 minutes until it is homogenous following which the mixture is discharged and sieved through a 2mm screen wherein the tailings are discarded. The mixture is then subject to quality control. According to steps 1.6 to 1.63 the mixture is released for weighing, checking, packing and despatch.

Trials in human volunteers were undertaken to test the hypothesis that regular consumption of pork enriched with long chain omega 3 fatty acids will lead to increased levels of these fatty acids in the circulation and resultant improvement in cardiovascular health.

The trial objective was to conduct a preliminary dietary intervention study with pork from pigs fed with supplements according to the present invention to determine of there would be any increase in the levels of EPA, DPA or DHA present in the plasma fatty acid pool or in erythrocyte (RBC) membrane phospholipids in human volunteers eating lean cuts of pork over a 4 week period. The tests endeavoured to determine whether the increase in omega 3 fatty acid supplementation would influence the two health parameters that are reportedly most responsive to omega 3 fatty acid supplementation namely reduction of plasma triglycerides and platelet thromboxane production.

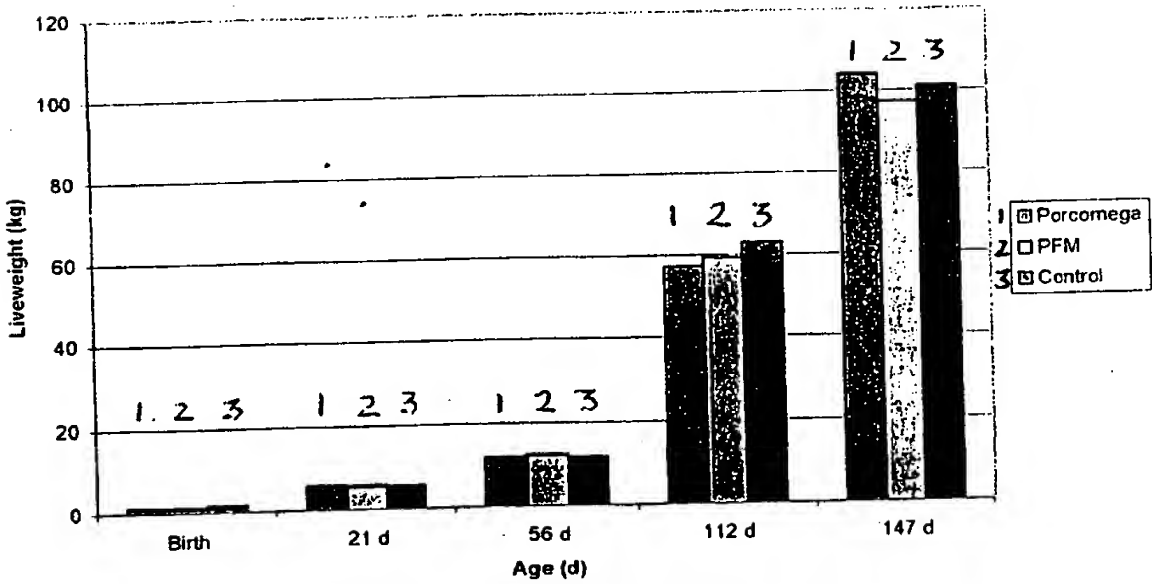
A study was conducted to determine how much omega 3 enrichment could be achieved using fish meal. Nine week old pigs were fed a ration containing 20% of a high grade fishmeal supplement formula according to the present invention. EPA, DPA and DHA accounted for 1.9, 0.5 and 6.5% respectively of total fatty acids in the diet. There were negligable amounts in a control diet. Groups of three pigs were fed the control diet for 7 or 11 weeks or the fish meal diet for 6 to 10 weeks before spaughter. Growth and feed conversion rates were similar in control and fish meal fed pigs. In the latter, omega 3 consumption averaged 15g/pig/day which resulted in striking increases in the plasma levels of DHA and particularly EPA. In the week before slaughter the high circulating levels declined but there was significant retention of long chain omega 3 polyunsaturated fatty acids including DPA in lean portions sampled from various cuts of fresh pork which increased with the duration of feeding. Graph 1 below depicts relative proportions of long chain fatty acids in selected cuts of meat from pigs fed a control diet ot the fishmeal supplement according to the invention for 10 weeks. Graph 2 shows omega 3 concentrations in selected cuts of meat from pigs fed a control diet of the fish meal supplement according to the present invention. The proportion of long chain omega 3 polyunsaturated fatty acidsin lean loin chops (4.3% fat) rose from 1.1% in controls to 6% in the fish meal fed pigs representing a yield of 250mg/100g of fresh meat. In forequarter chops the proportion was less(4.1%) but he fat content was higher(8.7%).Hence the omega 3 yield was even greater: 360mg/100g. Furthermore the surrounding layer of fat contained five times as much long chain omega 3 fatty acids. The study indicates that the omega 3 yield of pork products fed with a supplement according to the invention will depend upon their overall fat content.



Lifetime average daily gain

GRAPH 1

Change in Liveweight



GRAPH 2

. Change in Liveweight over Time.

Twenty seven volunteers (participants and their partners) completed the sensory evaluation of cooked pork. The results appear in Table 1 below and demonstrate no significant preference for either the n-3 enriched pork or the control pork. Most importantly the volunteers did not detect any preference for one pork over the other indicating that there was no detectable taint in the pork.

TABLE 1

Sensory evaluation of pork.

		prefer Porcomega	prefer normal pork	no preference
Loin	taste	7	12	8
	smell	5	2	20
	mouthfeel	11	8	8
Forequarter	taste	6	10	11
	smell	6	6	15
	mouthfeel	7	9	11
OVERALL		7.0	7.8	12.2

Detailed studies have been carried out on the carcasses of pigs fed with the supplement formula according to a regime commensurate with the stage of development of the pig.Results of the analyses of the carcasses vary according to the site. Tables 1-5 below set out examples of the formulae of the food supplements according to various embodiments of the invention. It was found that there were no significant dietary effects of the inclusion of the supplements according to the invention, fishmeal or fish oil on growth rate and slaughter characteristics of the pigs in

this study. The meat from all diets were found acceptable to consumers. None of the produce from Diets 1-5 were considered unacceptable. The determination of fatty acid profiles in meat samples was carried out by Professor Len Storlein of the Biological Sciences Department of the University of Wollongong New south Wales The dietary supplements are tailored to suit the stage of development of the pig. Of the Diets identified below, Diet 5 is the least preferred in favour of diets 1 - 4.

TABLE 2 DIETS 1-5

1	CONTROL
2	CONTROL + 3% FISH OIL
3	15% SEAPEP
4	15% SUPPLEMENT ACCORDING TO THE INVENTION (Porcomega)
5	15% SUPPLEMENT ACCORDING TO THE INVENTION (Porcomega)+ 3% FISH OIL

The following examples show that the omega 3 long chain fatty acid content of pork is significantly increased in pigs fed supplements in accordance with the present invention. The examples tabulate the fatty acid profile of phospholipid and Triglyceride from specified sites of male and female pigs for each of the diets identified in Table 2.

EXAMPLE 1

Fatty Acid Profile (DHA , EPA , DPA) of Phospholipid from Three Sites (Loin, Leg, Forequarter) in 5 MALE PIGS.

LOIN (as % of Fat)

DIET	DHA	EPA	DPA	Total n-3	n6/n3
1. Control	1.7177	0.7436	1.6755	5.035	7.044
2. Control +3%Fish Oil	4.5484	4.7766	1.2947	11.679	2.807
3.15% Seapep	5.5875	2.9664	1.6813	11.037	3.088
4.15% Porcomega	5.8751	4.2736	1.8344	12.941	2.600
5.15% Porcomega+3%Fish Oil	9.4645	3.0052	0.7113	13.181	2.219

LEG (as % of Fat)

DIET	DHA	EPA	DPA	Total n-3	n6/n3
1. Control	1.2720	0.5703	1.0655	4.2150	9.933
2. Control +3%Fish Oil	6.6598	4.8659	1.4591	13.309	1.943
3.15% Seapep	6.2464	1.9129	2.0729	11.376	2.994
4.15% Porcomega	8.5052	3.0288	1.0103	12.544	2.165
5.15% Porcomega+3%Fish Oil	7.5433	5.6210	0.0000	13.164	2.204

FOREQUARTER (as % of Fat)

DIET	DHA	EPA	DPA	Total n-3	n6/n3
1. Control	1.1029	0.6498	0.8971	3.655	10.430
2. Control +3%Fish Oil	6.3329	5.6516	1.5256	14.293	2.160
3.15% Seapep	6.7154	0.5542	1.6361	10.189	3.234
4.15% Porcomega	7.5528	4.6347	0.1816	13.381	2.349
5.15% Porcomega+3%Fish Oil	8.3222	5.0940	0.0000	13.332	1.889

EXAMPLE 2

Fatty Acid Profile (DHA , EPA , DPA) of Phospholipid from Three Sites (Loin, Leg, Forequarter) in 5 FEMALE PIGS.

LOIN (as % of Fat)

DIET	DHA	EPA	DPA	Total n-3	n6/n3
1. Control	2.7958	1.5085	1.5652	6.941	5.439/
2. Control +3%Fish Oil	6.4429	6.2143	1.9654	15.564	1.839
3.15% Seapep	6.1195	3.9108	1.9291	12.545	2.626
4.15% Porcomega	6.3399	6.9938	2.3628	16.132	2.018
5.15% Porcomega+3%Fish Oil	7.6822	7.3558	1.8541	17.537	1.673

EXAMPLE 3

Fatty Acid Profile (DHA , EPA , DPA) of Triglyceride from Three Sites (Loin, Leg, Forequarter) in 5 FEMALE PIGS.

LOIN (as % of Fat)

DIET	DHA	EPA	DPA	Total n-3	n6/n3
1. Control	0.2110	0.0519	0.1273	0.585	20.546
2. Control +3%Fish Oil	0.8181	0.2441	0.3250	1.684	1.844
3.15% Seapep	0.6097	0.0000	0.0000	0.610	3.061
4.15% Porcomega	0.8410	0.3872	0.0000	1.228	3.070
5.15% Porcomega+3%Fish Oil	0.7166	0.2839	1.1113	2.111	0.892

EXAMPLE 4

Fatty Acid Profile (DHA , EPA , DPA) of Triglyceride from Three Sites (Loin, Leg, Forequarter) in 5 MALE PIGS.

LOIN (as % of Fat)

DIET	DHA	EPA	DPA	Total n-3	n6/n3
1. Control	0.3949	0.0000	0.1557	0.740	11.041
2. Control +3%Fish Oil	4.2856	1.3361	0.6500	6.673	1.861
3.15% Seapep	1.3639	0.2781	0.1501	1.792	3.222
4.15% Porcomega	1.5530	0.3823	0.1366	2.072	2.720
5.15% Porcomega+3%Fish Oil	1.7744	0.5098	0.2049	2.608	1.509

A trial using 25 large white female pigs and the above Diets was commenced on 12 December 1996 with a (mean lightweight 21.5 kg) running through slaughter on 12 March 1997. At slaughter the pigs were weighed and values recorded. Sub samples from each sex and dietary treatment were taken for taste and taint evaluations.There were no signs of significant weight gain. There were no apparent differences in weight gain of the male pigs due to dietary treatment. A similar result occurred with females and there were no significant differences due to type of fishmeal or oil added to the diet.

The following table 3 shows carcass and performance data for female pigs.

Combined (male and female) statistical analysis of Figure 2 and table 2 showed a significant difference (P=0.0001) in dressing percentage between the male and female pigs. The effect of sex approached traditional significance (P=0.06) for ADG. There were no significant effects of diet (type of fishmeal or oil) on any parameter nor any significant interactions of sex and diet.

TABLE 2

Diet	No	Slaughter LWT	Wt(kg) DWT	DR%	P 2 (mm)	Gain (kg)	ADG (g/d)
1	5	100.4	69.4	69.1	18.8	79.0	888
2	5	103.8	70.7	68.1	18.2	81.9	920
3	5	102.1	70.7	69.3	15.2	81.2	912
4	5	100.1	69.3	69.2	18.6	79.3	891
5	5	103.7	73.0	70.4	17.4	81.3	914

Average daily gain calculated over an 89 day period.

Meat from each diet were evaluated for taste and taint . Meat was cooked in boiling water for 60 minutes. Small pieces of 1m3 from each treatment were evaluated for pork taste (with reference to a scale of 0-10 in which 10 is extremely tasty and for taint on a scale of 1-10 in which 10 is extremely tainted. The results of the tests are set out in table 3 below.

TABLE 3

The effect of diet on the taste and taint of male and female pig meat.

Diet	Subjects	Taste(0-10)	SE*	Taint(0-10)	SE
1	10	6.65	0.49	1.15	0.63
2	10	5.80	0.49	1.95	0.63
3	10	5.75	0.49	2.45	0.63
4	10	5.10	0.49	3.30	0.63
5	10	4.20	0.51	4.35	0.64

* Standard error of the mean.

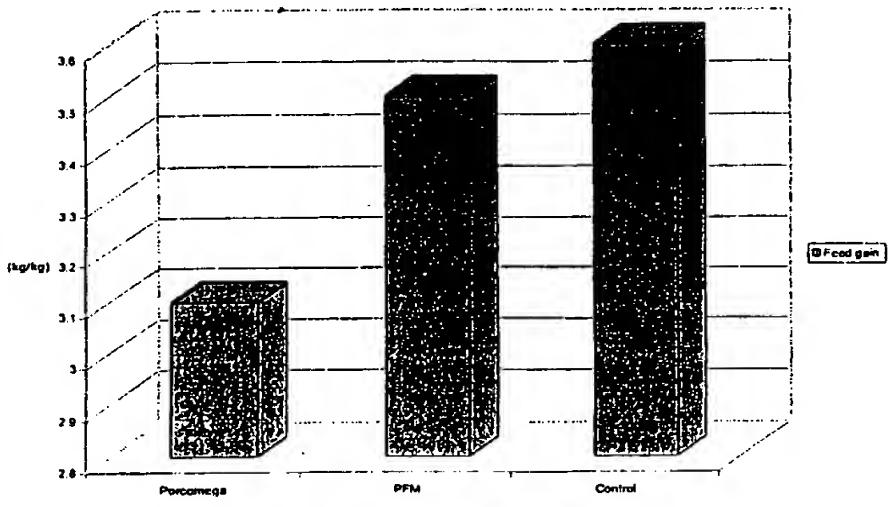
There were no significant effects of sex (of pig) on either taste or taint in this test. The results indicate no deleterious effects on either growthrate, carcass yield or carcass characteristics. Analysis indicates that the feed supplements according to the invention enhance the omega 3 long chain fatty acids content of the meat. The feed supplements may be used with or without withdrawal periods prior to slaughter.

Clinical trials show a beneficial thromboxane result having the desired consequential physiological effects.

A good measure of ration efficiency is the amount of feed required by a growing animal for it to gain a unit of weight. Feed represents 60-70% of the running costs of a piggery. It has been estimated that a 0.1 unit change in feed efficiency is worth about AU$40/sow/year in terms of feed. During the lactation phase, PFM fed sows consumed approximately 84kg of feed each for a net gain of 10 kg. Based on this their feed gain ratio was 8:4:1. Over the same period the feed gain ratio for the pigs fed with the supplement according to the inventio was 3:7:1 (74kg feed for 20kg gain). The Graph 3 below shows feed gain ratios and it can be seen that gain for grower pigs was best for those fed supplement according to the invention (3.1) followed by PFM pigs (3.5) and control pigs (3.6).

A taste panel found that there was a preference for pigs fed with the supplement a the PFM pigs suffered from fishy taint which was detected by all members of the taste panel.

GRAPH 3



: Feed:gain ratio's
(A low feed:gain ration is best, 3.1 is better than 3.6)

Annexure 1 sets out a range of supplement formulae according to embodiments of the invention which relate to the stage of growth of an animal which is fed the supplement.

It will be recognised by those skilled in the art that the compositions and supplement formula disclosed are examples only and that these or variations thereof may be fed to other animals such as but not limited to beef, cattle, sheep and poultry to achieve the objects of the invention and as such are therefore within the spirit and scope of the invention broadly described herein. For example, the consistency of the premixes before addition may be varied. The flavour of the system may be altered for instance using Fenugreek.

ANNEXURE

1. FORMULA PER TONNE PORCOMEGA* PIGLET STARTER EW 001 #

	kg	%
PORCOMEGA* BASE- SP	970.80	97.080
VITAMIN PREMIX PV 001	2.50	0.250
MINERAL PREMIX PM 001	10.00	1.000
AMINO ACID PREMIX PAA 001	10.00	1.000
CHOLINE CHLORIDE 60%	6.70	0.670
	1000.00	100.000

USAGE :- 150 KG PER TONNE OF PIGLET STARTER EW DIET.

1. PIG STARTER EW VITAMIN PREMIX PV 001

COMPOSITION INGREDIENT	POTENCY/GM	FORMULA	ACTIVE /Kg PREMIX
VITAMIN A-500	500,000 IU	53.60 gm	26,800,000 IU
VITAMIN D3-500	500,000 IU	13.40 gm	6,700,000 IU
VITAMIN E-50%	500 IU	52.80 gm	26,400 IU
VITAMIN K3	1000 mg	4.02 gm	4.02 gm
THIAMINE HYDROCHLORIDE USP	892 mg	4.51 gm	4.02 gm
RIBOFLAVIN 95% F.G.	950 mg	11.28 gm	10.72 gm
PYRIDOXINE USP	823 mg	6.51 gm	5.36 gm
VITAMIN B12-SUPPLEMENT 1%	10 mg	5.36 gm	53.60 mg
NIACIN USP	990 mg	54.14 gm	53.60 gm
CALCIUM d-PANTOTHENATE USP	920 mg	34.96 gm	32.16 gm
FOLIC ACID USP	920 mg	4.37 gm	4.02 gm
D-BIOTIN SUPPLEMENT 1%	10 mg	21.44 gm	214.40 mg
GREEN TEA POWDER – Anti Oxidant	1000 mg	120.00 gm	120.00 gm
VANILLIC CRYSTALS	1000 mg	53.60 gm	53.60 gm
WHEAT MEAL CARRIER		560.01 gm	
		1000.00 gm	

USAGE: 2.5 Kg per Tonne Porcomega* Pig Starter EW Supplement 001.

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8.

PIG STARTER EW- PORCOMEGA* AND COMPLETE FEED VITAMIN ADDITION

COMPOSITION INGREDIENT	ACTIVE /Tonne PORCOMEGA*	ACTIVE /Kg COMPLETE FEED
VITAMIN A-500	67,000,000 IU	10,000 IU
VITAMIN D3-500	16,750,000 IU	2,500 IU
VITAMIN E-50%	466,000 IU	69.5 IU
VITAMIN K3	10.05 gm	1.50 mg
THIAMINE HYDROCHLORIDE USP	10.05 gm	1.50 mg
RIBOFLAVIN 95% F.G.	26.80 gm	4.00 mg
PYRIDOXINE USP	13.40 gm	2.00 mg
VITAMIN B12-SUPPLEMENT 1%	134.00 mg	20.00 mcg
NIACIN USP	134.00 gm	20.00 mg
CALCIUM d-PANTOTHENATE USP	80.40 gm	12.00 mg
FOLIC ACID USP	10.05 gm	1.50 mg
D-BIOTIN SUPPLEMENT 1%	536.00 mg	80.00 mcg
CHOLINE CHLORIDE	4020.00 gm	600.00 mg
GREEN TEA POWDER	300.00 gm	44.77 mg
VANILLIC CRYSTALS	134.00 gm	20.00 mg

PIG STARTER EW MINERAL PREMIX PM 001

COMPOSITION INGREDIENT	POTENCY/GM	FORMULA	ACTIVE /Kg PREMIX
FERROUS SULPHATE (Fe SO4.H2O)	310.0 mg	216.125 gm	67.000 gm
ZINC SULPHATE	360.0 mg	186.110 gm	67.000 gm
MANGANESE SULPHATE (Mn SO4.H2O)	280.0 mg	95.715 gm	26.800 gm
POTASSIUM IODIDE(STAB)	68.8 mg	0.488 gm	0.335 gm
COBALT CARBONATE	460.0 mg	0.728 gm	0.335 gm
COPPER SULPHATE	250.0 mg	335.000 gm	83.750 gm
SODIUM SELENITE	400.0 mg	0.504 gm	0.201 gm
LIMESTONE CARRIER	1000.0 mg	165.330 gm	165.330 gm
		1000.000 gm	

USAGE: 10 Kg per Tonne Porcomega* Pig Starter EW Supplement 001.

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9.

PIG STARTER EW PORCOMEGA* AND COMPLETE FEED MINERAL ADDITIOI

COMPOSITION INGREDIENT	ACTIVE /Tonne PORCOMEGA*	ACTIVE /Kg COMPLETE FEED
FERROUS SULPHATE-Fe (Fe SO4.H2O)	670.00 gm	100.500 mg
ZINC SULPHATE-Zn	670.00 gm	100.500 mg
MANGANESE SULPHATE-Mn (Mn SO4.H2O)	268.00 gm	40.200 mg
POTASSIUM IODIDE(STAB)-I	3.35 gm	0.502 mg
COBALT CARBONATE-Co	3.35 gm	0.502 mg
COPPER SULPHATE-Cu	837.50 gm	125.625 mg
SODIUM SELENITE-Se	2.01 gm	0.301 mg

PIGLET STARTER EW AMINO ACID PREMIX PAA OOI

COMPOSITION INGREDIENT	FORMULA	/Kg PREMIX
l-LYSINE	6700.00 gm	670.00 gm
dl-METHIONINE	1340.00 gm	134.00 gm
THREONINE	1340.00 gm	134.00 gm
WHEAT MEAL CARRIER	620.00 gm	
	10000.00 gm	

USAGE :- 10 KG PER TONNE OF PORCOMEGA* PIGLET STARTER EW 001.

AMINO ACID ADDITIONS	/Tonne PORCOMEGA*	/Kg COMPLETE FEED
l-LYSINE	6700.00 gm	1000.00 mg
dl-METHIONINE	1340.00 gm	200.00 mg
THREONINE	1340.00 gm	200.00 mg

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10.

PORCOMEGA* PIGLET STARTER EW SUPPLEMENT 001

THEORETICAL ANALYSES TBA - *Needs recent analysis of fish meal.*

D.E. KJ/Kg	CALCIUM %
CRUDE FIBRE %	PHOSPHORUS (Total) %
CRUDE PROTEIN %	
CRUDE FAT %	
LYSINE (Total) %	
LYSINE (Avail) %	
METHIONINE %	
METH. + CYSTINE %	
ARGININE %	
GLYCINE %	
ISOLEUCINE %	
LEUCINE %	
THREONINE %	
TRYPTOPHAN %	
HISTIDINE %	
PHENYLALANINE %	
PHENYL.+ TYROSINE %	
SERINE %	
VALINE %	
FATTY ACIDS	
LINOLEIC ACID %	
LINOLENIC ACID %	
w-3	
EPA %	
DHA %	

2. FORMULA PER TONNE PORCOMEGA* PIG WEANER 002

	kg	%
PORCOMEGA* BASE SP	970.80	97.080
VITAMIN PREMIX PV 002	2.50	0.250
MINERAL PREMIX PM 002	10.00	1.000
AMINO ACID PREMIX PAA 002	10.00	1.000
CHOLINE CHLORIDE 60%	6.70	0.670
	1000.00	100.000

USAGE :- 150 KG PER TONNE OF PIG WEANER DIET 002.

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11.

2. PIG WEANER VITAMIN PREMIX PV 002

COMPOSITION INGREDIENT	POTENCY/GM	FORMULA	ACTIVE /Kg PREMIX
VITAMIN A-500	500,000 IU	53.60 gm	26,800,000 IU
VITAMIN D3-500	500,000 IU	13.40 gm	6,700,000 IU
VITAMIN E-50%	500 IU	52.80 gm	26,400 IU
VITAMIN K3	1000 mg	4.02 gm	4.02 gm
THIAMINE HYDROCHLORIDE USP	892 mg	3.00 gm	2.68 gm
RIBOFLAVIN 95% F.G.	950 mg	9.87 gm	9.38 gm
PYRIDOXINE USP	823 mg	4.88 gm	4.02 gm
VITAMIN B12-SUPPLEMENT 1%	10 mg	4.69 gm	46.90 mg
NIACIN USP	990 mg	40.61 gm	40.20 gm
CALCIUM d-PANTOTHENATE USP	920 mg	34.96 gm	32.16 gm
FOLIC ACID USP	920 mg	4.37 gm	4.02 gm
D-BIOTIN SUPPLEMENT 1%	10 mg	13.40 gm	134.00 mg
GREEN TEA POWDER		120.00 gm	120.00 gm
VANILLIC CRYSTALS	1000 mg	53.60 gm	53.60 gm
WHEAT MEAL CARRIER		580.07 gm	
		1000.00 gm	

USAGE: 2.5 Kg per Tonne Porcomega* Pig Weaner Supplement 002.

PIG WEANER- PORCOMEGA* AND COMPLETE FEED VITAMIN ADDITION

COMPOSITION INGREDIENT	ACTIVE /Tonne PORCOMEGA*	ACTIVE /Kg COMPLETE FEED
VITAMIN A-500	67,000,000 IU	10,000 IU
VITAMIN D3-500	16,750,000 IU	2,500 IU
VITAMIN E-50%	466,000 IU	69.5 IU
VITAMIN K3	10.05 gm	1.50 mg
THIAMINE HYDROCHLORIDE USP	6.70 gm	1.00 mg
RIBOFLAVIN 95% F.G.	23.45 gm	3.50 mg
PYRIDOXINE USP	10.05 gm	1.50 mg
VITAMIN B12-SUPPLEMENT 1%	117.25 mg	17.50 mcg
NIACIN USP	100.50 gm	15.00 mg
CALCIUM d-PANTOTHENATE USP	67.00 gm	10.00 mg
FOLIC ACID USP	10.05 gm	1.50 mg
D-BIOTIN SUPPLEMENT 1%	335.00 mg	50.00 mcg
CHOLINE CHLORIDE	3350.00 gm	500.00 mg
GREEN TEA POWDER	300.00 gm	44.77 mg
VANILLIC CRYSTALS	134.00 gm	20.00 mg

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12.

PIG WEANER MINERAL PREMIX PM 002

COMPOSITION INGREDIENT	POTENCY/GM	FORMULA	ACTIVE /Kg PREMIX
FERROUS SULPHATE (Fe SO4.1I2O)	310.0 mg	216.125 gm	67.000 gm
ZINC SULPHATE	360.0 mg	186.110 gm	67.000 gm
MANGANESE SULPHATE (Mn SO4.H2O)	280.0 mg	95.715 gm	26.800 gm
POTASSIUM IODIDE(STAB)	68.8 mg	0.488 gm	0.335 gm
COBALT CARBONATE	460.0 mg	0.728 gm	0.335 gm
COPPER SULPHATE	250.0 mg	335.000 gm	83.750 gm
SODIUM SELENITE	400.0 mg	0.504 gm	0.201 gm
LIMESTONE CARRIER	1000.0 mg	165.330 gm	165.330 gm
		1000.000 gm	

USAGE: 10 Kg per Tonne Porcomega* Pig Weaner Supplement 002.

PIG WEANER PORCOMEGA* AND COMPLETE FEED MINERAL ADDITION

COMPOSITION INGREDIENT	ACTIVE /Tonne PORCOMEGA*	ACTIVE /Kg COMPLETE FEED
FERROUS SULPHATE-Fe (Fe SO4.H2O)	670.00 gm	100.500 mg
ZINC SULPHATE-Zn	670.00 gm	100.500 mg
MANGANESE SULPHATE-Mn (Mn SO4.H2O)	268.00 gm	40.200 mg
POTASSIUM IODIDE(STAB)-I	3.35 gm	0.502 mg
COBALT CARBONATE-Co	3.35 gm	0.502 mg
COPPER SULPHATE-Cu	837.50 gm	125.625 mg
SODIUM SELENITE-Se	2.01 gm	0.301 mg

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13.

PIGLET WEANER AMINO ACID PREMIX PAA OO2

COMPOSITION	FORMULA	/Kg PREMIX
INGREDIENT		
l-LYSINE	6700.00 gm	670.00 gm
dl-METHIONINE	1340.00 gm	134.00 gm
THREONINE	1340.00 gm	134.00 gm
WHEAT MEAL CARRIER	620.00 gm	
	10000.00 gm	

USAGE:-10 KG PER TONNE OF PORCOMEGA* PIG WEANER SUPPLEMENT.

PIG WEANER AMINO ACID PREMIX PAA 002

AMINO ACID ADDITIONS	/Tonne PORCOMEGA*	/Kg COMPLETE FEED
l-LYSINE	6700.00 gm	1000.00 mg
dl-METHIONINE	1340.00 gm	200.00 mg
THREONINE	1340.00 gm	200.00 mg

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14.

PORCOMEGA* PIGLET WEANER SUPPLEMENT 002

THEORETICAL ANALYSES TBA

D.E. KJ/Kg
CRUDE FIBRE %
CRUDE PROTEIN %
CRUDE FAT %
LYSINE (Total) %
LYSINE (Avail) %
METHIONINE %
METH. + CYSTINE %
ARGININE %
GLYCINE %
ISOLEUCINE %
LEUCINE %
THREONINE %
TRYPTOPHAN %
HISTIDINE %
PHENYLALANINE %
PHENYL.+ TYROSINE %
SERINE %
VALINE %
FATTY ACIDS

LINOLEIC ACID %
LINOLENIC ACID %
w-3

EPA %
DHA %

CALCIUM %
PHOSPHORUS (Total) %

3. FORMULA PER TONNE PORCOMEGA* PIG BREEDER 003

	kg	%
PORCOMEGA* BASE SP	987.50	98.750
VITAMIN PREMIX PV 003	2.50	0.250
MINERAL PREMIX PM 003	10.00	1.000
	1000.00	100.000

USAGE :- 150 KG PER TONNE OF PIG BREEDER DIET 003.

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15.

3. PIG BREEDER VITAMIN PREMIX PV 003

INGREDIENT	POTENCY/GM	FORMULA	ACTIVE /Kg PREMIX
VITAMIN A-500	500,000 IU	53.60 gm	26,800,000 IU
VITAMIN D3-500	500,000 IU	5.36 gm	2,680,000 IU
VITAMIN E-50%	500 IU	134.00 gm	67,000 IU
VITAMIN K3	1000 mg	10.05 gm	10.05 gm
THIAMINE HYDROCHLORIDE USP	892 mg	4.51 gm	4.02 gm
RIBOFLAVIN 95% F.G.	950 mg	14.11 gm	13.40 gm
PYRIDOXINE USP	823 mg	4.88 gm	4.02 gm
VITAMIN B12-SUPPLEMENT 1%	10 mg	4.02 gm	40.20 mg
NIACIN USP	990 mg	54.14 gm	53.60 gm
CALCIUM d-PANTOTHENATE USP	920 mg	29.13 gm	26.80 gm
FOLIC ACID USP	920 mg	2.91 gm	2.68 gm
D-BIOTIN SUPPLEMENT 1%	10 mg	53.60 gm	536.00 mg
GREEN TEA POWDER		120.00 gm	120.00 gm
VANILLIC CRYSTALS	1000 mg	13.40 gm	13.40 gm
WHEAT MEAL CARRIER		496.29 gm	
		1000.00 gm	

USAGE: 2.5 Kg per Tonne Porcomega* Pig Breeder Supplement.

PIG BREEDER- PORCOMEGA* AND COMPLETE FEED VITAMIN ADDITION

INGREDIENT	ACTIVE /Tonne PORCOMEGA*	ACTIVE /Kg COMPLETE FEED
VITAMIN A-500	67,000,000 IU	10,000 IU
VITAMIN D3-500	6,700,000 IU	1,000 IU
VITAMIN E-50%	167,500 IU	25.0 IU
VITAMIN K3	10.05 gm	1.50 mg
THIAMINE HYDROCHLORIDE USP	10.05 gm	1.50 mg
RIBOFLAVIN 95% F.G.	33.50 gm	5.00 mg
PYRIDOXINE USP	10.05 gm	1.50 mg
VITAMIN B12-SUPPLEMENT 1%	75.00 mg	15.00 mcg
NIACIN USP	134.00 gm	20.00 mg
CALCIUM d-PANTOTHENATE USP	67.00 gm	10.00 mg
FOLIC ACID USP	6.70 gm	1.00 mg
D-BIOTIN SUPPLEMENT 1%	134.00 mg	200.00 mcg
CHOLINE CHLORIDE	2010.00 gm	300.00 mg
GREEN TEA POWDER	300.00 gm	44.77 mg
VANILLIC CRYSTALS	33.50 gm	5.00 mg

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16.

PIG BREEDER MINERAL PREMIX PM 003

COMPOSITION INGREDIENT	POTENCY/GM	FORMULA	ACTIVE /Kg PREMIX
FERROUS SULPHATE (Fe SO4.H2O)	310.0 mg	216.125 gm	67.000 gm
ZINC SULPHATE	360.0 mg	186.110 gm	67.000 gm
MANGANESE SULPHATE (Mn SO4.H2O)	280.0 mg	95.715 gm	26.800 gm
POTASSIUM IODIDE(STAB)	68.8 mg	0.488 gm	0.335 gm
COBALT CARBONATE	460.0 mg	0.728 gm	0.335 gm
COPPER SULPHATE	250.0 mg	13.400 gm	3.350 gm
SODIUM SELENITE	400.0 mg	0.251 gm	0.101 gm
LIMESTONE CARRIER	1000.0 mg	487.183 gm	
		1000.000 gm	

USAGE: 10 Kg per Tonne Porcomega* Pig Breeder Supplement 003.

PIG BREEDER PORCOMEGA* AND COMPLETE FEED MINERAL ADDITION

COMPOSITION INGREDIENT	ACTIVE /Tonne PORCOMEGA*	ACTIVE /Kg COMPLETE FEED
FERROUS SULPHATE-Fe (Fe SO4.H2O)	670.00 gm	100.500 mg
ZINC SULPHATE-Zn	670.00 gm	100.500 mg
MANGANESE SULPHATE-Mn (Mn SO4.H2O)	268.00 gm	40.200 mg
POTASSIUM IODIDE(STAB)-I	3.35 gm	0.502 mg
COBALT CARBONATE-Co	3.35 gm	0.502 mg
COPPER SULPHATE-Cu	33.50 gm	5.000 mg
SODIUM SELENITE-Se	1.01 gm	0.150 mg

USAGE:-10 Kg per Tonne Porcomega* Pig Breeder Supplement.

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17.

PORCOMEGA* PIG BREEDER SUPPLEMENT 003

THEORETICAL ANALYSES TBA

D.E. KJ/Kg
CRUDE FIBRE %
CRUDE PROTEIN %
CRUDE FAT %
LYSINE (Total) %
LYSINE (Avail) %
METHIONINE %
METH. + CYSTINE %
ARGININE %
GLYCINE %
ISOLEUCINE %
LEUCINE %
THREONINE %
TRYPTOPHAN %
HISTIDINE %
PHENYLALANINE %
PHENYL.+ TYROSINE %
SERINE %
VALINE %
FATTY ACIDS

LINOLEIC ACID %
LINOLENIC ACID %
w-3

EPA %
DHA %

CALCIUM %
PHOSPHORUS (Total) %

4. FORMULA PER TONNE PORCOMEGA* PIG BREEDER LACTATING 004 #

	kg	%
PORCOMEGA* BASE SP	984.15	98.415
VITAMIN PREMIX PV 004	2.50	0.250
MINERAL PREMIX PM 004	10.00	1.000
CHOLINE CHLORIDE 60%	3.35	0.335
	1000.00	100.000

USAGE :- 150 KG PER TONNE OF PIG BREEDER LACTATING DIET 004.

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18.

PIG BREEDER LACTATING VITAMIN PREMIX PV 004

COMPOSITION INGREDIENT	POTENCY/GM	FORMULA	ACTIVE /Kg PREMIX
VITAMIN A-500	500,000 IU	53.60 gm	26,800,000 IU
VITAMIN D3-500	500,000 IU	5.36 gm	2,680,000 IU
VITAMIN E-50%	500 IU	134.00 gm	67,000 IU
VITAMIN K3	1000 mg	10.05 gm	10.05 gm
THIAMINE HYDROCHLORIDE USP	892 mg	4.51 gm	4.02 gm
RIBOFLAVIN 95% F.G.	950 mg	14.11 gm	13.40 gm
PYRIDOXINE USP	823 mg	4.88 gm	4.02 gm
VITAMIN B12-SUPPLEMENT 1%	10 mg	4.02 gm	40.20 mg
NIACIN USP	990 mg	54.14 gm	53.60 gm
CALCIUM d-PANTOTHENATE USP	920 mg	29.13 gm	26.80 gm
FOLIC ACID USP	920 mg	2.91 gm	2.68 gm
D-BIOTIN SUPPLEMENT 1%	10 mg	53.60 gm	536.00 mg
GREEN TEA POWDER		120.00 gm	120.00 gm
VANILLIC CRYSTALS	1000 mg	13.40 gm	13.40 gm
WHEAT MEAL CARRIER		496.29 gm	
		1000.00 gm	

USAGE: 2.5 Kg per Tonne Porcomega* Pig Breeder Lactating Supplement.

PIG BREEDER LACTATING- PORCOMEGA* AND COMPLETE FEED VITAMIN ADDITION

COMPOSITION INGREDIENT	ACTIVE /Tonne PORCOMEGA*	ACTIVE /Kg COMPLETE FEED
VITAMIN A-500	67,000,000 IU	10,000 IU
VITAMIN D3-500	6,700,000 IU	1,000 IU
VITAMIN E-50%	167,500 IU	25.0 IU
VITAMIN K3	10.05 gm	1.50 mg
THIAMINE HYDROCHLORIDE USP	10.05 gm	1.50 mg
RIBOFLAVIN 95% F.G.	33.50 gm	5.00 mg
PYRIDOXINE USP	10.05 gm	1.50 mg
VITAMIN B12-SUPPLEMENT 1%	75.00 mg	15.00 mcg
NIACIN USP	134.00 gm	20.00 mg
CALCIUM d-PANTOTHENATE USP	67.00 gm	10.00 mg
FOLIC ACID USP	6.70 gm	1.00 mg
D-BIOTIN SUPPLEMENT 1%	134.00 mg	200.00 mcg
GREEN TEA POWDER	300.00 gm	44.77 mg
VANILLIC CRYSTALS	33.50 gm	5.00 mg

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19.

PIG BREEDER LACTATING MINERAL PREMIX PM 004

COMPOSITION INGREDIENT	POTENCY/GM	FORMULA	ACTIVE /Kg PREMI
FERROUS SULPHATE (Fe SO4.H2O)	310.0 mg	216.125 gm	67.000 g
ZINC SULPHATE	360.0 mg	186.110 gm	67.000 gn
MANGANESE SULPHATE (Mn SO4.H2O)	280.0 mg	95.715 gm	26.800 gn
POTASSIUM IODIDE(STAB)-I	68.8 mg	0.488 gm	0.335 gn
COBALT CARBONATE	460.0 mg	0.728 gm	0.335 gn
COPPER SULPHATE	250.0 mg	13.400 gm	3.350 gn
SODIUM SELENITE	400.0 mg	0.251 gm	0.101 gn
LIMESTONE CARRIER	1000.0 mg	487.183 gm	
		1000.000 gm	

USAGE: 10 Kg per Tonne Porcomega* Pig Breeder Lactating Supplement.

PIG BREEDER LACTATING PORCOMEGA* AND COMPLETE FEED MINERAL ADDITION

COMPOSITION INGREDIENT	ACTIVE /Tonne PORCOMEGA*	ACTIVE /Kg COMPLETE FEED
FERROUS SULPHATE-Fe (Fe SO4.H2O)	670.00 gm	100.500 mg
ZINC SULPHATE-Zn	670.00 gm	100.500 mg
MANGANESE SULPHATE-Mn (Mn SO4.H2O)	268.00 gm	40.200 mg
POTASSIUM IODIDE(STAB)-I	3.35 gm	0.502 mg
COBALT CARBONATE-Co	3.35 gm	0.502 mg
COPPER SULPHATE-Cu	33.50 gm	5.000 mg
SODIUM SELENITE-Se	1.01 gm	0.150 mg

USAGE:-10 Kg per Tonne Porcomega* Pig Breeder Lactating Supplement.

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20.

PORCOMEGA* PIG BREEDER LACTATING SUPPLEMENT 004

THEORETICAL ANALYSES TBA

D.E. KJ/Kg
CRUDE FIBRE %
CRUDE PROTEIN %
CRUDE FAT %
LYSINE (Total) %
LYSINE (Avail) %
METHIONINE %
METH. + CYSTINE %
ARGININE %
GLYCINE %
ISOLEUCINE %
LEUCINE %
THREONINE %
TRYPTOPHAN %
HISTIDINE %
PHENYLALANINE %
PHENYL.+ TYROSINE %
SERINE %
VALINE %
FATTY ACIDS

LINOLEIC ACID %
LINOLENIC ACID %
w-3

EPA %
DHA %

CALCIUM %
PHOSPHORUS (Total) %

5. FORMULA PER TONNE PORCOMEGA* PIG GROWER 005 #

	kg	%
PORCOMEGA* BASE SP	987.50	97.080
VITAMIN PREMIX PV 005	2.50	0.250
MINERAL PREMIX PM 005	10.00	1.000
	1000.00	100.000

USAGE :- 150 KG PER TONNE OF PIG GROWER DIET 005.

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21.

PIG GROWER VITAMIN PREMIX PV 005

COMPOSITION INGREDIENT	POTENCY/GM	FORMULA	ACTIVE /Kg PREMIX
VITAMIN A-500	500,000 IU	40.20 gm	20,100,000 IU
VITAMIN D3-500	500,000 IU	8.04 gm	4,020,000 IU
VITAMIN E-50%	500 IU	53.60 gm	26,800 IU
VITAMIN K3	1000 mg	2.68 gm	2.68 gm
THIAMINE HYDROCHLORIDE USP	892 mg	3.00 gm	2.68 gm
RIBOFLAVIN 95% F.G.	950 mg	7.05 gm	6.70 gm
PYRIDOXINE USP	823 mg	4.88 gm	2.68 gm
VITAMIN B12-SUPPLEMENT 1%	10 mg	2.68 gm	26.80 mg
NIACIN USP	990 mg	27.07 gm	26.80 gm
CALCIUM d-PANTOTHENATE USP	920 mg	23.30 gm	21.44 gm
FOLIC ACID USP	920 mg	1.46 gm	1.34 gm
D-BIOTIN SUPPLEMENT 1%	10 mg	13.40 gm	134.00 mg
GREEN TEA POWDER	1000 mg	120.00 gm	120.00 gm
VANILLIC CRYSTALS	1000 mg	6.70 gm	6.70 gm
WHEAT MEAL CARRIER		760.40 gm	
		1000.00 gm	

USAGE: 2.5 Kg per Tonne Porcomega* Pig Grower Supplement 005.

PIG GROWER - PORCOMEGA* AND COMPLETE FEED VITAMIN ADDITION

COMPOSITION INGREDIENT	ACTIVE /Tonne PORCOMEGA*	ACTIVE /Kg COMPLETE FEED
VITAMIN A-500	50,250,000 IU	7,538 IU
VITAMIN D3-500	10,050,000 IU	1,508 IU
VITAMIN E-50%	67,000 IU	10 IU
VITAMIN K3	6.70 gm	1.00 mg
THIAMINE HYDROCHLORIDE USP	6.70 gm	1.00 mg
RIBOFLAVIN 95% F.G.	16.75 gm	2.51 mg
PYRIDOXINE USP	6.70 gm	1.00 mg
VITAMIN B12-SUPPLEMENT 1%	67.00 mg	10.05 mcg
NIACIN USP	67.00 gm	10.05 mg
CALCIUM d-PANTOTHENATE USP	53.60 gm	8.04 mg
FOLIC ACID USP	3.35 gm	0.50 mg
D-BIOTIN SUPPLEMENT 1%	335.00 mg	50.25 mcg
GREEN TEA POWDER	300.00 gm	45.00 gm
VANILLIC CRYSTALS	16.75 gm	2.51 mg

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PIG GROWER MINERAL PREMIX PM 005

COMPOSITION INGREDIENT	POTENCY/GM	FORMULA	ACTIVE /Kg PREMIX
FERROUS SULPHATE (Fe SO4.H2O)	310.0 mg	216.125 gm	67.000 gm
ZINC SULPHATE	360.0 mg	186.110 gm	67.000 gm
MANGANESE SULPHATE (Mn SO4.H2O)	280.0 mg	95.715 gm	26.800 gm
POTASSIUM IODIDE(STAB)	68.8 mg	0.488 gm	0.335 gm
COBALT CARBONATE	460.0 mg	0.728 gm	0.335 gm
COPPER SULPHATE	250.0 mg	13.400 gm	3.350 gm
SODIUM SELENITE	400.0 mg	0.251 gm	0.101 gm
LIMESTONE CARRIER	1000.0 mg	487.183 gm	487.183 gm
		1000.000 gm	

USAGE: 10 Kg per Tonne Porcomega* Pig Grower Supplement 005.

PIG GROWER PORCOMEGA* AND COMPLETE FEED MINERAL ADDITION

COMPOSITION INGREDIENT	ACTIVE /Tonne PORCOMEGA*	ACTIVE /Kg COMPLETE FEED
FERROUS SULPHATE-Fe (Fe SO4.H2O)	670.00 gm	100.500 mg
ZINC SULPHATE-Zn	670.00 gm	100.500 mg
MANGANESE SULPHATE-Mn (Mn SO4.H2O)	268.00 gm	40.200 mg
POTASSIUM IODIDE(STAB)-I	3.35 gm	0.502 mg
COBALT CARBONATE-Co	3.35 gm	0.502 mg
COPPER SULPHATE-Cu	33.50 gm	5.025 mg
SODIUM SELENITE-Se	1.01 gm	0.151 mg

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PORCOMEGA PIG GROWER SUPPLEMENT 005.

THEORETICAL ANALYSES TBA

D.E. KJ/Kg
CRUDE FIBRE %
CRUDE PROTEIN %
CRUDE FAT %
LYSINE (Total) %
LYSINE (Avail) %
METHIONINE %
METH. + CYSTINE %
ARGININE %
GLYCINE %
ISOLEUCINE %
LEUCINE %
THREONINE %
TRYPTOPHAN %
HISTIDINE %
PHENYLALANINE %
PHENYL.+ TYROSINE %
SERINE %
VALINE %
FATTY ACIDS

LINOLEIC ACID %
LINOLENIC ACID %
w-3

EPA %
DHA %

CALCIUM %
PHOSPHORUS (Total) %

6. FORMULA PER TONNE PORCOMEGA* PIG FINISHER 006 #

	kg	%
PORCOMEGA* BASE SP	987.50	97.080
VITAMIN PREMIX PV 006	2.50	0.250
MINERAL PREMIX PM 006	10.00	1.000
	1000.00	100.000

USAGE :- 150 KG PER TONNE OF PIG FINISHER DIET 006.

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PIG FINISHER VITAMIN PREMIX PV006

COMPOSITION

INGREDIENT	POTENCY/Gm	FORMULA	ACTIVE /Kg PREMIX
VITAMIN A-500	500,000 IU	26.80 gm	13,400,000 IU.
VITAMIN D3-500	500,000 IU	5.36 gm	2,680,000 IU.
VITAMIN E-50%	500 IU	53.60 gm	26,800 IU.
VITAMIN K3	1000 mg	2.68 gm	2.68 gm
THIAMINE HYDROCHLORIDE USP	892 mg	3.00 gm	2.68 gm
RIBOFLAVIN 95% F.G.	950 mg	5.64 gm	5.36 gm
PYRIDOXINE USP	823 mg	4.88 gm	2.68 gm
VITAMIN B12-SUPPLEMENT 1%	10 mg	1.34 gm	13.40 mg
NIACIN USP	990 mg	18.95 gm	18.76 gm
CALCIUM d-PANTOTHENATE USP	920 mg	20.39 gm	18.76 gm
FOLIC ACID USP	920 mg	1.46 gm	1.34 gm
D-BIOTIN-SUPPLEMENT 1%	10 mg	13.40 gm	134.00 mg
GREEN TEA POWDER	1000 mg	120.00 gm	120.00 gm
VANILLIC CRYSTALS	1000 mg	4.02 gm	4.02 gm
WHEAT MEAL (CARRIER)	1000 mg	760.40 gm	
		1000.00 gm	

USAGE: 2.5 Kg per Tonne Porcomega* Finisher Supplement 006.

PIG FINISHER - PORCOMEGA* AND COMPLETE FEED VITAMIN ADDITION

COMPOSITION INGREDIENT	ACTIVE /Tonne PORCOMEGA*	ACTIVE /Kg COMPLETE FEED
VITAMIN A-500	33,500,000 IU	5,025 IU
VITAMIN D3-500	6,700,000 IU	1,005 IU
VITAMIN E-50%	67,000 IU	10.05 IU
VITAMIN K3	6.70 gm	1.01 mg
THIAMINE HYDROCHLORIDE USP	6.70 gm	1.01 mg
RIBOFLAVIN 95% F.G.	13.40 gm	2.01 mg
PYRIDOXINE USP	6.70 gm	1.01 mg
VITAMIN B12-SUPPLEMENT 1%	33.50 mg	5.03 mcg
NIACIN USP	46.90 gm	7.04 mg
CALCIUM d-PANTOTHENATE USP	46.90 gm	7.04 mg
FOLIC ACID USP	3.35 gm	0.50 mg
D-BIOTIN SUPPLEMENT 1%	335.00 mg	50.00 mcg
GREEN TEA POWDER	300.00 gm	45.00 mg
VANILLIC CRYSTALS	10.05 gm	1.51 mg

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25.

PIG FINISHER MINERAL PREMIX PM 006

COMPOSITION INGREDIENT	POTENCY/GM	FORMULA	ACTIVE /Kg PREMIX
FERROUS SULPHATE (Fe SO4.H2O)	310.0 mg	216.125 gm	67.000 gm
ZINC SULPHATE	360.0 mg	186.110 gm	67.000 gm
MANGANESE SULPHATE (Mn SO4.H2O)	280.0 mg	95.715 gm	26.800 gm
POTASSIUM IODIDE(STAB)	68.8 mg	0.488 gm	0.335 gm
COBALT CARBONATE	460.0 mg	0.728 gm	0.335 gm
COPPER SULPHATE	250.0 mg	13.400 gm	3.350 gm
SODIUM SELENITE	400.0 mg	0.251 gm	0.101 gm
LIMESTONE CARRIER	1000.0 mg	165.330 gm	165.330 gm
		1000.000 gm	

USAGE: 10 Kg per Tonne Porcomega* Finisher Supplement 006

PIG FINISHER PORCOMEGA* AND COMPLETE FEED MINERAL ADDITION

COMPOSITION INGREDIENT	ACTIVE /Tonne PORCOMEGA*	ACTIVE /Kg COMPLETE FEED
FERROUS SULPHATE-Fe (Fe SO4.H2O)	670.00 gm	100.500 mg
ZINC SULPHATE-Zn	670.00 gm	100.500 mg
MANGANESE SULPHATE-Mn (Mn SO4.H2O)	268.00 gm	40.200 mg
POTASSIUM IODIDE(STAB)-I	3.35 gm	0.502 mg
COBALT CARBONATE-Co	3.35 gm	0.502 mg
COPPER SULPHATE-Cu	33.50 gm	5.025 mg
SODIUM SELENITE-Se	1.01 gm	0.151 mg

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